LENGTH-FREQUENCY STUDIES ON CATFISH *TACHYSURUS THALASSINUS* AT WALTAIR DURING 1964-1970

P. MOJUMDER
Waltair Research Centre of CMFR Institute, Visakhapatnam-3.

ABSTRACT

Determination of age and growth of the catfish *Tachysurus thalassinus* (Ruppell) has been attempted employing length-frequency method, during the years 1964-65 to 69-70. The fish is found to attain an average length of 18 cm at the end of its first year, 35 cm at the end of 2nd year and 42 cm at the end of 3rd year. The fishery along the Visakhapatnam coast is supported mainly by those which have completed one year. The spawning season starts around April and continues up till July or August, and the young-ones start entering the fishery from November|December.

INTRODUCTION

The catfish fishery is a very important fishery along the east coast of India; three species, viz., *Tachysurus thalassinus, T. tenuispinis* and *T. coelatus,* contributing to more than 20% of the demersal catches by the trawlers (Sekharan et al. 1968). Along Andhra-Orissa coast, *T. thalassinus* alone contributes to 38.2% of the catfish catch (Sekharan 1968). Some aspects on the biology of this species, in respect to its food habits and the length-weight relationship, have already been published (Mojumder 1969, and 1971). The distribution and abundance of catfish along the Andhra-Orissa coast have been studied by Sekharan (1968 and 1973). The present paper deals with the results of analysis of the length-frequency data of *T. thalassinus* collected during the years 1964-65 to 69-70.

MATERIAL AND METHODS

The material collected during the years 1964-65 to 69-70, from the catches obtained off Visakhapatnam, between latitude zones 17°N and 18°N, formed the basis of this study. The samples were collected either at the time of fishing, on board the trawlers, or at the time of landing at the jetty. A total of 11,061 specimens including both males and females of *T. thalassinus* were measured. The frequency polygons at size intervals of 2 cm for the six years are presented in Figs. 1 and 2.

OBSERVATIONS

During 1964-65 four modes, a (a & a1), b (b, b1 & b2), c, and d were observed. In April 64 there were two well-marked modes, a at 20 cm and b at 46 cm. Of these two major modes, a at 20 cm could be traced to 32 cm in January 65, and then to 36 cm in April indicating that the difference in age between a and b is one year. A growth rate of 1.33 cm per month was estimated during the year for a. Mode a appearing first at 18 cm in May 64 was traceable to 30 cm in February 65, after which it probably merged with a. The second mode b at 36 cm in April 64, which is probably in the second year of growth, could be followed to 44 cm in March 65 and to 46 cm in April 65. This shows that the age difference between b and c was one year. A growth rate of 0.77 cm per month in total length could be recorded for b. The minor modes b1 and b2 probably merged with b after September 64 and March 65 respectively. The mode c at 46 cm in April could not be traced further. A new mode d at 16 cm in December 64 represents the new recruits, probably the result of spawning during the previous April-August, which view is supported by the following observations. The young ones with yolk sac, having the total length between 2.5 and 3.0 cm, were collected in July in 1966 and

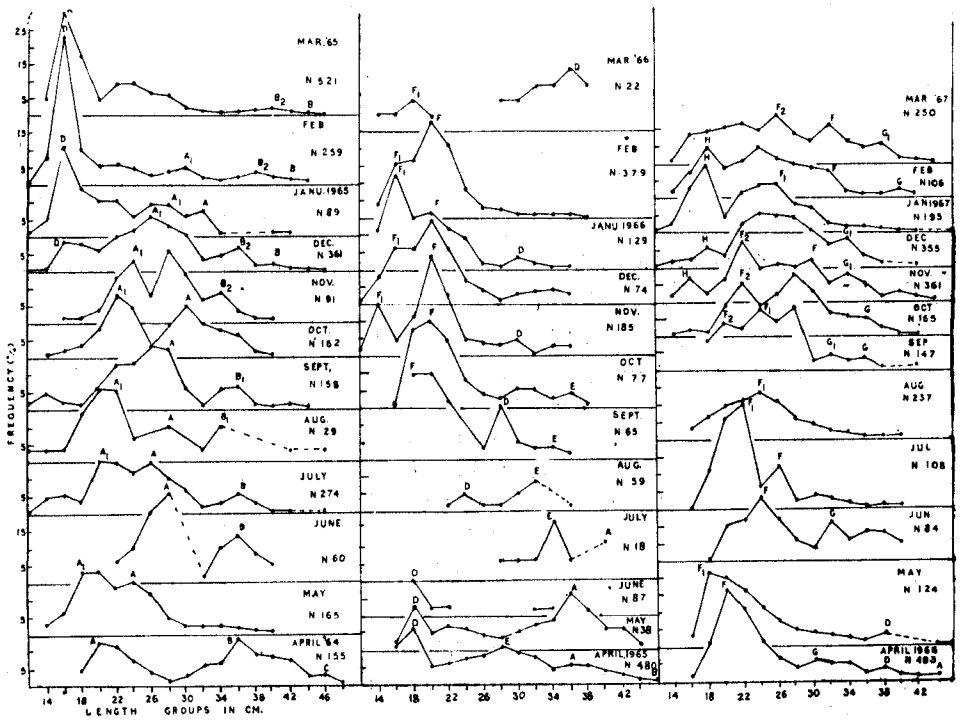

FIG. 1. Length frequency distribution in the Cat-fish, *Tachysurus thalassinus* in different months of the year 1964-65 (A), 1965-66 (B) and 1966-67 (C).

1969, and juveniles of 8-10 cm total length were recorded in September in 1964 and 1967; the next commercial size groups between 14 and 16 cm were available in trawl catches during December/January. In other words, a growth of about 11-12 cm in 6-7 months, i.e., about 1.8 to 2.0 cm per month, was observed.

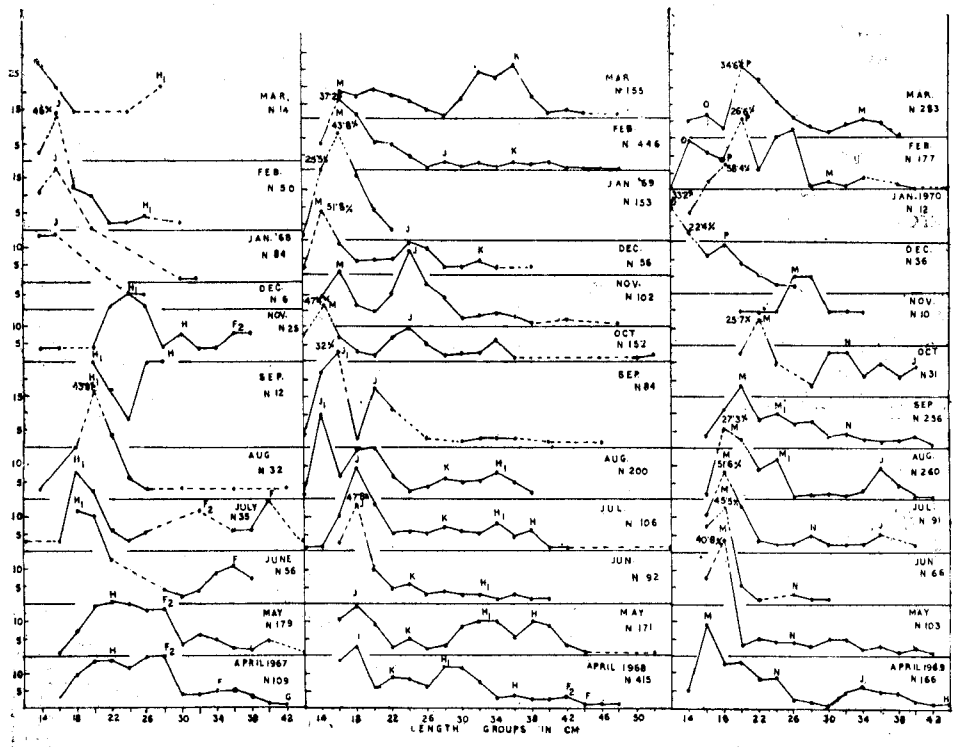

FIG. 2. Length frequency distribugtion in the Cat-fish, *Tachysurus thalassinus* in different months of the year 1967-68 (A), 1968-69 (B) and 1969-70 (C).

Recruitment of juveniles having the modal size 16 cm (mode d) continued during the next three months, between January and March 65, as a result of which the mode d was maintained at the same size group up to March 65. At the end of one year, in April 65, it attained 18 cm in total length, i.e., a growth rate of 1.4 cm per month was observed. In brief, based on the data of 64-65, *T. thalassinus* appears to attain 18 cm in total length at the end of one year, 36 cm at the end of two years and 44 cm at the end of three years.

During 1965-66, the mode a at 36 cm in April 65, being the continuation of the mode which first appeared at 20 cm in April 64, could be regarded as size of fish after completion of second year of life. This mode a can again be traced up to 40 cm in July 65, after which it disappeared only to reappear in April 66 at 44 cm, probably after completing the third year of life. Similarly,

the mode b first observed at 36 cm in April 64 and followed up to 44 cm in March or to 46 cm in April 65 might have completed its third year of life. The modal group d first observed at 16 cm in December 64 progressed to 18 cm in April 65 and then to 36 cm in March 66 or 38 cm in April 66. A growth of about 1.5 cm per month was hence recorded, with the total length at the end of second year as 38 cm. A new mode a at 28 cm during April 65, probably the product of a new brood, could be followed only up to 36 cm in October 65, after which further progression could not be observed. Another mode f at 18 cm, representing a new brood, appeared in September 65 which progressed to 20 cm in October. This 18 cm mode, however, continued to appear during the rest of the months of 65-66, probably due to heavy recruitment through out the period. The mode f seen at 20 cm in April 65 is perhaps the growth of the new brood at the end of one year. Thus, in 65-66 *T. thalassinus* is found to grow to a total length of 20 cm after one year, 38 cm after two years and 44 cm at the end of three years.

In 1966-67, the mode d at 38 cm, which is the continuation of the mode seen at 18 cm in April 65 and thereafter followed up to 36 cm in March 66, could be regarded as in the second year's growth. This mode was maintained during the next month but could not be traced further during the year. The mode f seen at 20 cm in April 66 shifted to 32 cm in March and 34 cm in April 67, and a growth rate of 1.17 cm per month was recorded at the end of second year. The mode f1 which first appeared at 14 cm in November 65 shifted to 24 cm in October 66 and 26 cm in January 67 showing a growth rate comparable to that of f. The mode f2 seen first at 20 cm in October 66 shifted to 26 cm in March 67. A mode g at 30 cm first appeared during April 66 could be followed up to 40 cm in February and further to 42 cm in April 67, with a growth rate of 1.0 cm per month, which might be the growth at the end of third year of a new batch of fish, probably from late spawners. Another mode h at 16 cm representing a new brood appeared in November 66 and progressed to 22 cm in April 67 having perhaps completed first year of life.

Thus, in 66-67, *T. thalassinus* attained a length of 22 cm at the end of one year, 34 cm at the end of 2nd year and 42 cm at the end of 3rd year.

In 1967-68, the mode f at 34 cm in April 67 completing two years progressed to 40 cm in July 67 and disappeared probably to reappear at 44 cm in April 68 completing 3 years of life. Mode f2 which first appeared at 20 cm in October 66 appeared at 28 cm in April 67 and 36 cm in November 67 completing the second year's growth and at 42 cm in April 68 completing 2½ years' growth. The mode h at 22 cm in April 67 could be followed up to 30 cm in November 67, after which it disappeared to reappear once again at 36 cm during April 68 perhaps after completing of the 2nd year of life. The mode h1, first appearing at 18 cm in June 67, progressed to 28 cm in April and then to 34 cm in August 68 completing 2nd year's growth, and afterwards it pro-

bably merged with h to reappear in April 69 at 44 cm. The mode j representing a new brood made its first appearance at 14 cm and contributed to the commercial fishery during December 67. This mode progressed to 16 cm in February 68 and further to 18 cm in April 68 after completion of one year. Hence in 1967-68 the growth attained at the end of one year is 18 cm, at the end of two years 36 cm and third year 42 cm.

In 1968-69, the mode h at 36 cm in April 68, of fish completed 2 years, progressed to 38 cm in July 68. The mode h1 at 28 cm in April could also be followed up to July when it attained 34 cm, and afterwards both these modes probably merged, and disappeared to reappear at 44 cm in April 69, perhaps completing 3rd year of life, showing a growth rate of 0.67 cm per month.

The mode j which first appeared in December 67 and then at 18 cm in April 68 further progressed to 32 cm in March 68 and to 34 cm in April 68 completing 2nd year of life. One new mode k at 22 cm could be followed up to 36 cm in March 69 but after which it disappeared. Again, a new mode m at 14 cm in October contributing to the fishery of the year progressed to 16 cm during March/April 69 completing one year of life. Hence during the year 68-69, the fish attained 16 cm after one year, 34 cm after two years and 44 cm after three years.

During 1969-70 the modal size j at 34 cm, which has completed 2 years, progressed to 40 cm in October 69. This mode, however, could not be traced further. The mode m at 16 cm in April 69 which first appeared in October 68 progressed to 34 cm in March 70, probably after the completion of 2 years. Mode n at 24 cm in April 69 might have come from a new brood. This mode could be traced up to October 69 at 32 cm, but not seen for the rest of the period. Two other new modes, o at 12 cm and p at 18 cm in December 69, which are fresh recruits to the fishery, grew up to 16 cm and 20 cm respectively in March 70, the average length attained being 18 cm, which may be considered as growth for the first year. During this year, thus, the fish attained 18 cm at the end of first year, 34 cm at the end of 2nd year and 40 cm at the end of the third year.

Discussion and Conclusion

The spawning season of *T. thalassinus* generally starts from around April each year and continues up to July/August. The resultant young ones start entering the fishery usually from November/December. It is this recruitment that is responsible for the well-marked first mode during this period. The growth of this O-year class could be estimated before the start of the next spawning season. The products of spawning of a particular fishery season grow to commercial size and enter the fishery of the very next season. The modal length of these recruits was 20-21 cm during 1964-65 and 66-67; in 65-66 and 68-69 it was 18-19.9 cm. The minimum size group of 16-17.9 cm was noticed in 69-70 and the maximum, 22-23.9 cm, noticed in 67-68. This difference in the

growth rates of the 0-year class observed in the different years is seen also with respect to different year classes of the species. Again, in the same year class there were more than one modal size group representing probably the products of the late spawning of the previous spawning season. Variations observed in the sizes of the fish constituting different year classes in different years may, perhaps, be on account of shifting of the period of spawning and/or the post-larval recruitment.

Thus it is observed from the six years' study that the total length of *T. thalassinus* varies between 16 and 22 cm with an average of 18 cm at the end of first year of its life, between 34 and 36 cm with an average of 35 cm at the end of second year, and between 40 and 44 cm with an average of 42 cm at the end of third year.

Considering the composition of the different year classes annually (Table 1), it is seen that the one-year-old fish contributes most to the fishery. In the year 1967-68, however, both 0-year and 1-year olds shared equally in the composition of the catch.

..TABLE 1. *Percentage composition of the three year classes in the six years...*

Age group	1964-65	65-66	66-67	67-68	68-69	69-70
0	27.3	18.4	15.3	46.1	32.0	7.5
I+	61.3	69.5	80.4	45.8	58.4	81.0
II	11.4	12.1	4.3	8.1	9.6	11.5

ACKNOWLEDGEMENTS

I am grateful to late Dr. K. V. Sekharan and to Dr. B. Krishnamoorthi for critically going through the paper and offering valuable suggestions. My thanks are due to Dr. K. V. Sekharan for also making available the data collected by him during the years 1964-65 to 68-69.

REFERENCES

MOJUMDER, P. 1969. Food of the cat-fish, *Tachysurus thalassinus* (Ruppell). *Indian J. Fish.*, 16 (1 & 2): 161-169.

MOJUMDER, P. 1971. Length-weight relationship in the cat-fish *Tachysurus thalassinus* (Ruppell). *Indian J. Fish.*, 18 (1 & 2):

SEKHARAN, K.V. 1968. The cat-fish resources of the coasts of Andhra Pradesh, Orissa and West Bengal. *Proc. Symp. Living Resources of the Seas around India, Centr. Mar. Fish. Res. Inst.*, 517-536.

SEKHARAN, K.V. 1973. The depth distribution of the cat-fishes *T. thalassinus* (Ruppell) and *T. tenuispinis* (Day) in the north-western Bay of Bengal. *Indian J. Fish.*, 20 (1): 193-202.

SEKHARAN, K.V., M.S. MUTHU, K.V. SUBBA RAO, V. RAMAMOHANA RAO, P. MOJUMDER and S. REUBEN. 1968. Exploratory trawling on the continental shelf along the north-western part of the Bay of Bengal, *Proc. Symp. Living Resources of the Seas around India, Centr. Mar. Fish. Res. Inst.*, 280-337.